Comments

NYE COUNTY
DEPARTMENT OF NATURAL RESOURCES & FEDERAL FACILITIES
1210 E. Basin Rd. Ste. #6 • Pahrump, Nevada 89048
(702) 727-7727 • Fax (702) 727-7919

January 15, 1999

Transmitted via Facsimile to
(760) 255-8809
Attention: Dennis Schramm

Mr. Dick Martin, Superintendent
Death Valley National Park
Furnace Creek, California 92328

Nye County Comments on the General Management Plan and Draft Environmental Impact Statement (DEIS) for Death Valley National Park, California and Nevada

Dear Mr. Martin:

Nye County appreciates the opportunity to review and comment on the subject DEIS. As discussed with you and several of your staff at the December 12, 1998, meeting at our Pahrump office, Nye County has several concerns with the scope and content of the DEIS. Our concerns stem from the Park Service's general viewpoint that the effects of Park Service actions and policies do not extend beyond the Park Service lands. Such a viewpoint has resulted in a failure to include several analyses in the DEIS that are required by the implementing regulations of the National Environmental Policy Act (NEPA).

NDNR1

Our comments are presented in three parts. First, the comments made and discussed at length at the December 12 meeting, are presented in the body of this letter. These comments represent our major concerns about the adequacy of the DEIS, and we expect that final EIS will address these deficiencies. The second part of our comment package identifies the specific impacts to Nye County that have occurred and continue to occur, as a result of National Park Service actions and policies. These impacts are well documented, support the comments made in this letter, and must be included in the appropriate sections of the Final EIS. The third section is a cumulative impact analysis, conducted in accordance with Department of Interior guidance, specifically, that of the Bureau of Land Management. Nye County notes that its technical staff has adhered to the strictest technical standards in its preparation of this review.

Nye County hopes to continue its interactions with you and the Death Valley National Park staff, especially with respect to water resources. In this regard we recognize that our perspective might not, and in fact most likely is not, in agreement with the federal or even state perspectives. We believe however, that the context in which our analysis is offered is valid, and warrants equal consideration pursuant to the provisions of 40 CFR 1508.27(a), which states:

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NDNR1. The impact analysis actually does report some effects (not significant) on the grazing industry and on county tax receipts as a result of plan implementation. However, the socioeconomic analysis also concluded that these negative effects may be offset by positive benefits from tourism.

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> "Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and ***the locality*** (emphasis added). Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant."

As the management of Death Valley National Park is a site-specific action, we believe that a discussion of the impacts of the action, policies, and plans, on Nye County, and the significance of those impacts must be fully evaluated considered, and disclosed. Where impacts are determined to be significant, mitigating measures must be implemented.

NDNR2

In this regard Nye County notes for the record that the DEIS identifies formal policies of the National Park Service that have been and will continue to be implemented to protect Park water resources. The DEIS fails to discuss, however, the impacts of these policies on the local residents, local business, and local government. Such analyses and discussions are required by the provisions of 40 CFR 1508.18 (b)(1), (2), and (3). As noted in the public meetings, and at the meetings held between Nye County, its residents and businesses, and the Park Service staff, the implementation of these policies has resulted in significant cost burdens to the residents, businesses, and local government of Nye County. While such impacts may not be "intentional" (as frequently stated by Park Service staff) the impacts are occurring nonetheless, are significant, and require mitigation.

Nye County also notes for the record that although the region of influence for purpose of describing the affected environment includes communities in Nye County, the impact analyses do not extend beyond the boundaries of Park Service-managed lands. Such an approach to impact analysis is clearly inadequate. The final EIS must include an impact analysis that includes the locale surrounding Park Service-managed lands, and must account for the direct effects of Park Service policies on water availability to the residents, businesses, and government of Nye County. Further, it must identify the indirect effects of the cost burden the policy has placed on Nye County's residents business, and government. The enclosed Nye County analyses identify and discuss those impacts. Where the Park Service disagrees with the County's findings, an explanation, supported by data and factual information, must be included in the response to our comments.

NDNR3

Finally, Nye County, a local government affected by the National Park Service's proposed action and policies, formally requests by way of this letter that the points discussed herein, and within our enclosed analyses, be addressed in a formal reply to this office. We note at this time, that information formally requested via letter in August

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NDNR2. The National Park Service does not knowingly take any action that results in direct impacts to non-NPS lands outside our boundaries. However, given our mission to preserve and protect Park resources, the Park Service does actively participate in local, state, and other federal permitting processes that allow entities that may be affected by an action to comment and testify regarding those effects. Our actions to identify possible effects on Park resources are undertaken in the same manner that any other concerned citizen, organization or agency would take to prevent adverse effects to their property. Park Service activities relates to water management are following the laws and policies of the state of Nevada.

The National Park Service believes that water conservation and protection of aquifers is important to the economy and quality of life in the area.

NDNR3. The Park staff is working with Nye County on a memorandum of understanding for communications and notification regarding water and other matters of joint interest.

Comments

1998 to assist us in our review of this DEIS still has not been received. Thus, some parts of our analyses submitted in the enclosure must be considered to be provisional.

Nye County appreciates the opportunity to comment on the DEIS, and looks forward to working with you in the resolution of our concerns and issues. If you have questions regarding our comments or desire additional information on this matter, please contact MaryEllen C. Giampaoli, at (702) 875-4594.

Very truly yours,
NYE COUNTY, NEVADA

Les Bradshaw

Les Bradshaw, Manager
Department of Natural Resources and Federal Facilities

Cc: Nye County Board of Commissioners
Jerry McKnight
MaryEllen Giampaoli

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Discussion of Impacts to Water Resources Resulting from Actions of the National Park Service

The National Park Service has stewardship responsibility for the Death Valley National Park that includes two areas in Nevada. These areas, the "Nevada Triangle" (an area of about 171 square miles of which about 165 square miles are located in Nye County) and Devils Hole (an area of 40 acres located adjacent to the Ash Meadows National Wildlife Refuge). The status of the Death Valley National Park was changed by Congress on October 31, 1994 (through the California Desert Protection Act) from a National Monument to a National Park, and the area under Park Service stewardship was increased to about 3.3 million acres. This increase was limited to areas in California.

The mission of the Death Valley National Park is to protect significant desert features that provide world class scenic, scientific, and educational opportunities for visitors and academics to explore and study. The mission of the National Park Service is to preserve the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations.

Impact of Mission Related Actions

The National Park Service (NPS) recently released their Draft Environmental Impact Statement and General Management Plan for Death Valley National Park (NPS, September, 1998). The management objectives for this plan include a number of goals that have implications with respect to the water resources of Nye County. These objectives include the perpetuation of native plants, animals and ecosystems including rare and endangered species such as the Devils Hole pupfish, and the perpetuation and increase in water resource science and conservation. During the public scoping phase of their NEPA analysis, the NPS identified a number of water resource issues:

> *Restoration of numerous springs is needed (e.g. Marl Spring) to make them suitable for wildlife.*
>
> *Consider the possible effects of BLM and NPS activities and regional developments (e.g. Stateline and Yucca Mountain) on water quality and quantity and vegetation.*
>
> *Address Department of the Interior leadership needed in resolving water issues, including adjudication.*
>
> *Address water resource issues (e.g. potential conflict of federal management objectives for Ash Meadows area).* (NPS; September 1998, p. 44).

Specific actions aimed at achieving management objectives and addressing these issues have been identified by the NPS and include:

> *Identify all water sources within the boundaries of the park;*
>
> *Identify as a federally reserved water right all unappropriated water from any water source identified on federal lands within the boundaries of the park;*
>
> *Share water source inventory data;*
>
> *Vigorously defend federally reserved water rights through the state of California administrative process and in proceedings pursuant to Nevada Water Law that may authorize groundwater withdrawals that may impact water sources to which federally reserved or appropriated water rights are attached; and*

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Pursue acquisition of water rights within the park. (NPS, September 1998, pp. 61-62)

Since 1989, in response to concerns over the massive water right filings by the Las Vegas Valley Water District, the National Park Service has protested numerous water right applications within the Death Valley Flow System, which encompasses all of southern Nye County. The stated policy of the NPS is:

> **"...to follow state administrative procedures and to pursue negotiated settlements to protect its [NPS] water rights. Following State procedures, the NPS has protested numerous water appropriation applications. In many instances NPS reached settlement agreements with the applicants (for example, an agreement between NPS and the Department of Energy concerning water right applications of DOE)."** (NPS Water Resources Division, October 1997 p. 10-12)

NDNR4

In practice, the NPS has protested almost all water right applications in southern Nye County since 1989 that requested more than 6 acre-feet per year of appropriative right. The NPS actions taken to fulfill their management objectives have had, and continue to have, a number of demonstrable impacts upon the availability of water resources in Nye County.

Direct Impacts

The direct impacts of NPS actions on the water resources of Nye County include: (1) the loss of agricultural jobs and productivity, (2) a decrease in the water available for other uses in the region of influence, (3) an increase in the cost of water right acquisitions, (4) increases in operational costs for local business, and (5) a decrease in the growth rate of the agricultural sector of the County's economy.

The past actions taken by the NPS to vigorously defend reserved water rights through administrative process and the seeking of judicial remedy have had a number of adverse impacts on Nye County. On June 7, 1976, the U.S. Supreme Court ruled that water right withdrawals in the vicinity of Devils Hole must be limited to a level necessary to maintain water levels in Devils Hole above a determined level. This ruling followed the NPS appeal of a decision by the Nevada State Engineer to permit water withdrawals for irrigation purposes. As a consequence of the Court's ruling, the owners of the farm involved in the legal action were forced into bankruptcy resulting in the shutdown of a 12,000 acre ranch and the loss of more than 80 jobs with an annual payroll of more than $340,000.

NDNR5

NPS claims a federally reserved water right for all unappropriated water from any source on federal wilderness and/or park areas. Although these rights have not been adjudicated, these claims add to the over-appropriation of the Amargosa Valley hydrographic basin. Any water right that is reserved for federal use in the region of influence reduces the quantity of water that is available for other uses by the public or local government entities.

In reaching settlements with water right applicants, the NPS has required that conditions regarding monitoring, annual duties, and the period of withdrawal be attached to the permit. Specific examples include the requirement that Bond Gold Bullfrog, Inc. and the DOE drill monitoring wells and monitor water levels and spring discharge rates. In other instance, the NPS has required that water right applicants

NDNR6

significantly reduce either their requested diversion rates or annual duties, and/or their type of application (permanent versus temporary). Some water right applicants, including the DOE and U.S. Ecology, Inc., have had to haul water for their operations pending the resolution of NPS protests. The delays in water right permitting, the requirements for monitoring, and the need to haul water to sustain operations while NPS protest issues are resolved to the NPS's satisfaction, have increased the cost of water right acquisition in Nye County.

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NDNR4. Generally speaking, a planning document like the *Draft Environmental Impact Statement / General Management Plan* describes proposed actions and alternatives that are within the federal decision-maker's discretion to implement. With respect to water rights, there is very little discretion because the National Park Service is required by federal law to protect the water rights of the United States. The mandate to protect these rights is based upon Park-specific enabling legislation and general authorities as provided by the 1916 Organic Act, General Authorities Act of 1970, and NPS policy. The Park Service participates in California and Nevada administrative water rights proceedings to protect federal reserved, riparian, and appropriative rights established for Death Valley from injury by outside threats such as new appropriations for groundwater located upgradient of Park water sources. Through state administrative procedures, the Park Service seeks to protect both quantified and unquantified federal reserved rights. Actions taken by the Park Service have included filing protests to applications for permits to appropriate groundwater when it has determined that the effects of groundwater pumping under these applications would potentially impair Park water rights and resources. These actions follow the substantive administrative procedures for California and Nevada water rights. As the comments suggest, protests are often resolved, and administrative hearings avoided, through negotiated settlements.

It is not the intent of the Park Service to impede the legitimate goals of applicants for groundwater, as was suggested in some of the comments. It is, however, the intent of Park Service to fully protect the water resources of Death Valley and the resource attributes that are dependent upon or related to those water resources.

In Nevada, for example, the Park Service has protested many applications for groundwater rights on the grounds that, if approved, the appropriations would impair the Park Service's senior state appropriative and federal reserved water rights if

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In some instances, the NPS has approved reductions in the scope of monitoring. In late 1997, after more than six years of monitoring, the NPS concurred with the DOE's request to reduce the scope of monitoring of water withdrawals for site characterization activities at Yucca Mountain.

Because of the increased costs of water appropriations for negotiations, protest hearings, monitoring requirements, and temporary water supplies, the profits from key economic sectors of Nye County have been reduced. Any time profits are reduced in the private sector, there is a corresponding reduction in the taxes generated from the affected operations.

It is difficult to quantify the cost impacts that have occurred as a direct result of the Park Service's water policies in the region of influence. The additive costs associated solely with the protest process can be appreciable. An applicant may spend several tens of thousands of dollars on consultants and legal fees for the preparation of monitoring plans, negotiations with the Park Service, and testimony at a protest hearing. If additional monitoring wells are required, as in the case of DOE (one well) and Bond Gold Bullfrog, Inc., (four wells) the cost can exceed $ 100,000. Other costs for monitoring have included the purchase of staff gages and spring discharge monitoring and recording equipment by the applicant for the Park Service in Death Valley. The additive costs of routine monitoring of water levels and springs varies depends upon the number of monitoring stations and the frequency of measurements but can also be several tens of thousands of dollars per year.

The costs of providing temporary water supplies until Park Service concerns have been resolved can also be appreciable. The costs to U.S. Ecology to haul water from Beatty to their facility (a distance of about 11 miles) were in excess of $ 5,000 per month. Similar costs were probably realized by the DOE.

Although the total costs that have resulted from the Park Service's policy cannot be readily estimated, it is obvious that the costs have not been insignificant, at least several hundreds of thousands of dollars and perhaps more.

Indirect Impacts

NDNR7

The indirect impacts of past and present NPS actions, policies, and plans include increased water costs, decreased tax revenues, decreases in the long-term productivity of private lands, and exacerbation of groundwater overdraft in Pahrump Valley. Because of delays in obtaining water rights because of potential NPS protests, some entities have opted to purchase existing water rights for their uses rather than obtain water rights through the Nevada appropriative process. The costs of water rights have steadily risen in southern Nevada over the last decade; a portion of this increase in cost can be attributed to NPS policies.

Because of NPS actions, it is no longer feasible to obtain and develop new water rights for lands in the vicinity of Devils Hole, and it is more difficult and costly to obtain and develop new water rights in areas where the NPS believes the development might impact park lands. As a consequence, there has been, and continues to be, a loss of the long-term productivity of the affected lands. Although the value of this loss of productivity cannot be estimated, the shut down of the Spring Meadows Ranch clearly demonstrates that the loss is appreciable both in terms of revenues and employment.

NDNR8

The NPS plans to establish a satellite office in Pahrump or elsewhere within the Death Valley flow system. The establishment of such an office will presumably result in a small incremental increase in the population of Pahrump with a corresponding incremental increase in the demand for water. Any action that increases the demand for water in Pahrump can be expected to increase the cost for water and exacerbate the existing overdraft situation in the basin.

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flows from Death Valley' s springs or spring complexes and Devils Hole, which are discharge areas for regional-groundwater flow systems, are reduced or eliminated and biological resources impaired as a result of upgradient groundwater withdrawals. In most instances involving a determination of impacts due to the proposed withdrawal of groundwater, the National Park Service' s understanding of the geohydrology may be no better, nor worse, than that of applicants who seek to appropriate groundwater. However, the Park Service has negotiated settlements (for example, with Department of Energy, and Barrick Bullfrog, Inc.) and achieved cooperative solutions to such protests by having the issued Permits to Appropriate the Public Waters of the State of Nevada conditioned upon the establishment and operation of monitoring programs designed to identify potential impacts at Death Valley. The monitoring programs are structured in such a way that impact shall at a time be identified and location sufficient to allow for the mitigation and/or remediation of any projected impact to Death Valley. The National Park Service believes that having this information benefits both the Park Service and Nye County.

NDNR5. The existence of all water rights limits the availability of new water rights. The Park Service has, for several years, supported the development of technical tools to assist in analyzing impacts to water rights/water resources at Death Valley resulting from existing and proposed water development upgradient from the Park. The Park Service continues to support technical investigations by U.S. Geological Survey and others because information gaps remain in several areas. To this end, the Park Service initiated the annual Devils Hole Workshop, a forum for scientists and natural resource managers working on water related issues in the Death Valley Flow System and particularly the Devils Hole area to exchange information. The Park Service supports cooperative endeavors currently underway by the U.S. Geological Survey, U.S. Department of Energy, Nye County, and others for developing a regional

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Impacts from Land Withdrawal

NDNR9

The withdrawal of land for the Death Valley National Park has eliminated the potential for groundwater development from the withdrawn lands. Thus the water resources underlying an area of about 165 square miles in Nye County have been committed to the needs of the Park Service and are no longer available for development by Nye County, its residents, or business sectors. The quantity of water that has been committed has not been identified.

Recent actions suggest that the NPS may seek to expand Department of Interior controls over public and private lands in southern Nye County. The NPS - Western Region nominated all public lands adjacent to NPS Lands a Park Service Buffer Area of Critical Environmental Concern (BLM, May 1998, p. K-56). The BLM did not recommend that this ACEC nomination be designated citing the fact that "the area was not specific enough to allow for an analysis of the values, if any, of the 'buffer lands.'" Such designations, should they be pursued by the NPS in the future, would have the same types of impacts as those discussed for the BLM ACEC designations. However, based upon consultations with the National Park Service, there are no plans at present to nominate any areas as ACECs nor does the Park Service anticipate ever seeking buffer areas around Death Valley National Park (personal communication, Mr. Dick Martin, Superintendent, Death Valley National Park, Nov. 12, 1998).

Impacts from Water Use

NDNR10

Provisional data concerning historic water use at Death Valley National Park were made available by the National Park Service. Existing water uses include the Furnace Creek Ranch (a privately run hotel and golf course), consumption by tourists and park staff, wildlife, and irrigation of non-native vegetation including lawns, salt cedars, and palm trees. Table 1 summarizes the water use at Death Valley National Park. Total water use for 1994 was estimated to be about 805 million gallons or 2,470 acre-feet. These water use numbers are approximations as metered data is only available for some of the areas and for limited time periods.

According to discussions with Park Service staff, the water use at the Furnace Creek Ranch hotel and resort has been reduced since these 1994 estimates were made. Currently, the hotel resort uses 38 to 39 million gallons per month or about 1,400 to 1,436 acre-feet per year (personal communication, Mr. Mel Essington, National Park Service, 12 Nov 1998).

According to visitation data presented in the NPS's DEIS, the number of visitors to Death Valley National Park almost doubled between 1990 and 1997 from 691,000 to over 1,222,000. A corresponding increase in the demand for water has probably occurred however, without more consistent meter data and more accurate estimates, this increase cannot be accurately estimated as part of this evaluation. The impacts of water use in Death Valley on the up-gradient portions of the flow system, if any, have not been evaluated. As these uses are supplied primarily by springs, there probably are not any significant impacts on the water resources of Nye County. The impacts are likely limited to Death Valley and probably include reduced areas of habitat fed by springs and increased salinity of the groundwater.

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model of the Death Valley Groundwater Flow System and other scientific information to improve understanding for the geohydrology of the system. However, completion of these endeavors, and others yet to be started, will take some time before enough data is available to improve upon current predictive capability. Additionally, the Park Service will pursue protection actions using available scientific information to determine potential for impact and, will continue to seek the collection of additional data through negotiated resolutions to water right permit protests.

NDNR6. See response to comment NDNR4.

NDNR7. See response to comment NDNR4.

NDNR8. There would likely be one restroom in a facility of this type. The amount of water needed for this office facility would be inconsequential.

NDNR9. The withdrawal of land in Nye County for Death Valley is not an action resulting from this plan. This action occurred as a result of a Presidential Executive Order in 1933. The Park is not seeking the designation of buffer areas by the Bureau of Land Management.

NDNR10. Information you provided regarding water use by Park staff and visitors has been incorporated into the "Affected Environment" and "Environmental Consequences" sections. We agree with your conclusion that water use in Death Valley is not significantly impacting water resources in Nye County.

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Table 1. 1994 Water Use at Death Valley National Park (Source: Provisional data from NPS files)			
Water System	**Average Annual Use (Million Gallons)**	**Average Annual Use (acre feet)**	**Comments**
Cow Creek	58.400	179.2	unmetered
Furnace Creek	42.828	131.4	metered broken in 1992
Wildrose	0.748	2.3	unmetered
Stovepipe Wells	0.131	0.4	meter removed 1993
Scotty's Castle	72.237	221.7	Sep 89-Apr 94 data
Grapevine	3.561	10.9	unknown type & period
Mesquite Campground	1.041	3.2	unmetered
Fred Harvey at Stovepipe Wells	1.280	3.9	Jan 90-Mar 94
Fred Harvey at Furnace Creek	611.971	1,878	Sep 89-Mar 94
Timbisha Village	12.572	38.6	Dec 91-Mar 94
Totals	804.768	2,470	

Nye County Perspective of the Cumulative Effects on Water Resources

Probably the most important water resource issues related to the indirect impacts of National Park Service actions at Death Valley relate to the cumulative adverse impacts of past, present, and reasonably foreseeable future actions in Nye County on the present and future availability of water resources in the region. As a consequence, this discussion is related to the issue of cumulative impacts as a they apply to the supply of agricultural, mining, and quasi-municipal water supplies, and water needed to support wildlife and habitat.

Definition of Reasonably Foreseeable Future Action Scenarios

NDNR11

The "reasonably foreseeable future" is not defined in NEPA or in its implementing regulations. For the purposes of this evaluation, the reasonable foreseeable future is defined in accordance with the U.S. Bureau of Land Management (BLM) *Guidelines for Assessing and Documenting Cumulative Impacts* (April 1994). This guidance states:

> "The reasonably foreseeable action is not a worst-case scenario but a rational projection that combines known action and reasoned, defensible assumptions about future events and developments. It is not necessary (or desirable) to project reasonably foreseeable future actions on maximum development; rather they should be based on what is reasonable, using available and anticipated future technology and defensible economic projections." (as cited, pp. 24-25)

The BLM guidance suggests that Reasonably Foreseeable Future Actions Scenarios (RFFAS) be developed for the purposes of estimating long-term cumulative impacts. The RFFAS, according to this

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NDNR11. The National Park Service acknowledges your cumulative effects analysis and we believe it serves to support NPS actions to protect water resources of Death Valley from upgradient developments. Clearly, efforts to protect the federal reserved water right have not caused the overdraft and over-appropriation of water in the Pahrump and Amargosa Valleys that are cited. These activities are the reason why the Park Service actively participates in the state permitting process to ensure protection of water resources.

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guidance, should be based upon existing planned actions as set forth in Resource Management Plans, actions that are likely to occur on private, state and other federal land that may impact the same resources as the specific proposed action in question, and clearly documented assumptions. (as cited, pp. 25-26) Based upon the available information and the assumptions summarized and discussed below, three RFFAS were developed for cumulative impact evaluation. The proposed actions for each scenario are summarized in Table 2. For the purposes of this evaluation, the reasonably foreseeable future extends through the year 2050.

The Resource Management Plans, Environmental Impact Statements, and other NEPA documents that were used to define the planned federal actions that may impact water resources within the region of influence during the reasonably foreseeable future are listed in Table 3.

The proposed actions and management policies that have been adopted, or are proposed in these documents are considered in all three scenarios. It is assumed that withdrawals of National Park Service lands and military reservations, including the Nellis Air Force Range, will be maintained throughout the reasonably foreseeable future as will the lands under the stewardship of the Bureau of Land Management. Further, based upon consultations with the steward agencies, it is assumed that the resource management strategies set forth in the documents listed above will continue in the reasonably foreseeable future. The definition of the impacts upon water resources associated with these federal actions, policies, and management strategies are discussed in the section on the effects of past and present actions.

In addition to the federal actions defined and evaluated in these sources, there are a number of non-federal actions that must also be taken into account in evaluating the cumulative impacts on Nye County's water resources. These actions include: (1) Nye County's proposed Nevada Science and Technology Corridor; (2) the Las Vegas Valley Water District's proposed water withdrawals in Clark and Nye County; (3) the expected growth in Pahrump, Amargosa Valley, and Beatty; (4) the closure of the gold mine at Beatty; and (5) actions associated economic development at the Nevada Test Site under the auspices of the Nevada Test Site Development Corporation (NTSDC). Information concerning these actions and proposed actions was obtained from published feasibility studies, consultations with the proponents, town boards, regional planning commissions, and information concerning water right applications on file with the DWR.

Uncertainty exists with respect to predicting future growth in Nye County, or almost anywhere for that matter. As a consequence, assumptions must be made concerning growth rates and water consumption. For the purposes of this evaluation, the following assumptions are made:

Assumption 1. Pahrump will experience a full build-out by the year 2050 and all water rights currently held within Pahrump Valley hydrographic basin will be put to beneficial use by that time. Based upon current Nye County projections, the total water demand in the year 2050 will be 84,000 acre feet per year, representing an overdraft of 65,000 acre feet per year on the groundwater resources of the basin. This assumption is included in the definition of all three scenarios.

Rationale Nye County projections indicate that the population of Pahrump will approach 150,000 people by the year 2050 with a corresponding demand of 84,000 acre feet per year (Buqo, 1996). This projection was based upon a per capita consumption rate of 486 gallons per day and a reduction in agricultural water withdrawals of twenty per cent per decade. The projected demand of 84,000 acre-feet per year is more than four times the established perennial yield of the basin and is more than three times the steady-state pumping rate of 26,000 acre-feet per year. The steady-state pumping rate was calculated by Harrill (1986, pp. 47-48), and used by the Nevada Division of Water Resources to take into account return flows from agriculture, domestic use, and public-supply and commercial use (Nevada Division of Water Resources, Supplemental Ruling on Remand, In The Matter of Application 51632, June 2, 1989, Peter G. Morros, State Engineer, Finding of Fact VI).

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Table 2. Reasonably Foreseeable Future Acton Scenarios Use in NEPA Impact Evaluation			
Proposed or Existing Action or Assumption	Reasonably Foreseeable Future Action Scenario		
	Scenario 1	Scenario 2	Scenario 3
Overdraft in Pahrump Valley and Amargosa Desert; Full use of perennial yield of Jackass Flat and Rock Valley	X	X	X
No future development in Mercury Valley	X	X	X
BLM – Resource Management Plans	X	X	X
Death Valley National Park General Management Plan	X	X	X
Nellis Land Withdrawal	X	X	X
U.S. Forest Service Plans	X	X	X
DOE-NTS/ER monitoring only	X	X	
DOE-NTS/ER active groundwater controls			X
Las Vegas Valley Water District Full Development of Groundwater Resources in Clark County			X
High-Level Waste Repository at Yucca Mountain		X	X

NOTES: DOE-NTS/ER = Department of Energy Nevada Test Site Environmental Restoration Program - Scenarios 1 and 2 include only passive groundwater controls (monitoring and institutional controls). Scenario 3 includes active groundwater controls (plume control through capture and treatment or hydraulic barriers coupled with institutional controls).

Table 3. Federal Agency Documents Used In This Evaluation.	
Agency	NEPA Documentation
U.S. Department of Interior Bureau of Land Management	Proposed Las Vegas Resource Management Plan and Final Environmental Impact Statement (May 1998), Record of Decision (October 1998), and Implementation Plan (in preparation) Tonopah Resource Management Plan and Implementation Plan
U.S. Department of Interior National Park Service	Draft Environmental Impact Statement and General Management Plan, Death Valley National Park, California and Nevada (August, 1998)
U.S. Department of Energy Nevada Operations Office	Nevada Test Site, Resource Management Plan, Working Draft (May 21, 1998) Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada (August 1996) and Record of Decision (December 1996) Draft Intermodal Transportation Environmental Assessment (September 1998) Final Waste Management Programmatic EIS (1997) and Record of Decision (in preparation)
U.S. Air Force	Renewal of the Nellis Air Force Range Land Withdrawal, Draft Legislative Environmental Impact Statement
U.S. Forest Service	Proposed Research Natural Area EA Roadless Area Plan and Forest Plan Revision

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Assumption 2. Amargosa Valley will place all water rights currently held within the Amargosa Desert hydrographic basin to beneficial use by the year 2050. Based upon current Nye County projections, the total demand in the year 2050 will be at least 29,000 acre-feet per year, representing an overdraft of at least 5,000 acre feet per year on the groundwater resources of the basin. This assumption is included in the definition of all three scenarios.

Rationale It would be erroneous to assume that future water withdrawals in the region of influence will be limited to the published perennial yields or steady-state pumping rates of the source basins, as has been assumed by some investigators. The histories of water withdrawals in Pahrump Valley, Las Vegas Valley, and other basins in Nevada clearly demonstrate that water withdrawals within a given basin are not limited by the perennial yield. According to the estimates made by the Nevada Division of Water Resources, groundwater withdrawals in Pahrump Valley have exceeded the perennial yield of the basin every year since at least 1983. Water use in Pahrump is accelerating at present and the effects associated with full development of the existing water rights must be considered in a NEPA evaluation of the region of influence.

At present, the existing water rights in Amargosa Desert exceed the perennial yield of that basin. It is quite plausible that growth will accelerate and that all of these existing rights will be put to use within the next half-century. Agricultural production in the Amargosa Desert hydrographic basin is driven largely by market factors and concerns over water right forfeitures. The development of large-scale dairy operations in the valley (Ponderosa Dairy) has provided a ready market for farmer's forage crops and increased the agricultural productivity of the area. Beginning in 1995, water right forfeiture proceedings spurred an increase in water use in the basin. As a consequence of the increased agricultural production and the threat of additional forfeitures, water withdrawals have increased dramatically over the last seven years. As of the summer of 1998, new areas in Amargosa Valley were being prepared for irrigation in 1999 (as observed during Nevada Test Site Citizens Advisory Board Tour of Amargosa Valley on October 7, 1998), thus the demand for water is expected to increase significantly over the short-term.

Residential and business development in Amargosa Valley is also occurring. A small but thriving hotel and casino, RV park, and golf course has opened in the south end of the community and new businesses have been established. Residential development is occurring and subdivision and parceling activities reported by the Nye County Department of Planning indicate that new quasi-municipal and domestic wells will be drilled as these new lots are developed.

Current and future trends in the parceling and subdividing of land suggest that the drilling of domestic wells will accelerate in the near future in Amargosa Valley. Water withdrawals from domestic wells do not require a water appropriation under Nevada Water Law. Therefore, future withdrawals for domestic purposes will be additive to those projected on the basis of current water rights. Further, even in basins such as Amargosa Valley that have been designated as closed to additional water right appropriations for irrigation, new water rights may be granted for quasi-municipal and commercial purposes. These water rights would also be additive to those currently appropriated within the basin. Therefore, an overdraft of the Amargosa Desert is to be expected within the reasonably foreseeable future. Because of planned federal land acquisitions and disposals, and actions relative to water rights in the basin, it is premature to predict the full growth potential of the community of Amargosa Valley and hence the magnitude of overdraft. However, it is considered reasonable to assume that an overdraft of at least 5,000 acre-feet per year will occur by the year 2050. This overdraft represents the full development of the 28,650 acre-feet of water rights that have been granted and the demand for a very conservative estimate of 350 additional domestic wells at one acre foot per year per well.

Assumption 3. Because of current and future overdraft of Pahrump Valley, projected future overdraft of Amargosa Desert, and planned and reasonably foreseeable actions related to the development of the

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Nevada Science and Technology Corridor and the NTSDC, the entire perennial yields of the Jackass Flat and Rock Valley hydrographic basins will be put to beneficial use by the year 2050. This assumption is included in the definition of all three scenarios.

Rationale With respect to the Nevada Science and Technology Corridor, the development of the proposed Nevada Science Museum and the Amargosa Valley Science and Technology Park are actions which are expected to occur in the reasonably foreseeable future. These actions will increase the demand for water in the hydrographic basins north of U.S. Highway 95 (Jackass Flats and Rock Valley). Minor increases in water demand that are already occurring as a result of NTSDC developments (e.g., Kistler Aerospace and Fluid Tech, Inc.) are expected to increase as future actions such as VentureStar, solar energy projects, and other developments occur. These basins are also under investigation as sources for supplemental water supplies to mitigate the projected overdrafts in Pahrump Valley and Amargosa Desert. Because of environmental concerns with respect to Mercury Valley and groundwater contamination from underground nuclear testing in Buckboard Mesa, Frenchman Flat, and Yucca Flat, the only two hydrographic basins in southern Nye County where unappropriated groundwater could be reasonably expected to be developed for supplemental supplies are Jackass Flats and Rock Valley. Therefore, it is assumed in this analysis that all of the legally available groundwater in these two basins will be appropriated and put to a beneficial use by the year 2050 in all scenarios.

Assumption 4. Because of growth in Clark County, all of the available water resources of the hydrographic basins in Clark County will be put to beneficial use by the year 2050. This assumption is included in the third scenario.

Rationale On a more regional scale, a rigorous NEPA evaluation must also consider trends in water development in Clark County and their implications with respect to future water use. To provide water for the continued growth of metropolitan Las Vegas, the Southern Nevada Water Authority and Las Vegas Valley Water District have filed water right applications in basins up gradient of Nye County. The District has filed water right applications in Three Lakes Valley (north and south hydrographic basins) and Tikapoo Valley (north and south hydrographic basins). The quantities of water filed for are in excess of the perennial yields of these basins. Recently (September 1998), the Nevada Division of Lands filed three water right applications in Three Lakes Valley for a new prison. Pending resolution of protests related to these applications, it is not possible to determine at this time what future water developments will occur in the valleys located hydraulically up gradient of Nye County. However, based upon the continued growth of metropolitan Las Vegas, it is considered reasonable to assume that all legally available water in Clark County will be appropriated and placed into beneficial use by the year 2050. However, as such development is not likely to occur until sometime after the year 2020, it is only included in one scenario.

Assumption 5. Because of wildlife concerns associated with Devils Hole and Ash Meadows, no additional significant water withdrawals beyond those of the DOE will occur in Mercury Valley or from the areas within the Amargosa Desert hydrographic basin that are situated hydraulically up gradient of these environmentally sensitive areas. This assumption is included in all three scenarios.

Rationale Previous attempts to increase agricultural productivity near Devils Hole resulted in a lowering of water levels in this feature that raised concerns about the continued existence of the Devils Hole pupfish. Planned conversion of these agricultural lands to residential uses was also considered by some to be an unacceptable threat to the aquatic species at Ash Meadows and led to the purchase of this land for preservation. Because of concern that increased water production from up gradient areas would adversely impact the habitat at Devils Hole and Ash Meadows, it is considered highly unlikely that signficant water withdrawals in the area will be permitted by the Nevada Division of Water Resources. However, the small quantities of water presently used for domestic and quasi-municipal purposes will continue to occur and may increase slightly over the next 52 years. Should the demand for water increase for some

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unforeseen future development, it is likely that water would be imported to the reason to avoid adverse impacts on Devils Hole and Ash Meadows.

Scenario 1 Baseline Cumulative Impacts

The baseline cumulative direct and indirect impacts on water resources as a result of past, present, and reasonably foreseeable future actions in Table 4. Table 4 lists the cumulative impacts from mission related activities along with those from the non-federal sector. Table 5 lists the cumulative impacts from the land withdrawals and designations, and Table 6 lists the cumulative impacts from water appropriations, water right claims, and water use by the federal agencies and private sector. These impacts represent the expected cumulative impacts of past and present actions by both federal agencies and private enterprises. The cumulative impacts of these actions have resulted in a number of significant cumulative impacts on water resources including injury through contamination, constraints on water development (both in terms of availability and the loss of locations for water wells), increased demands for water, overdraft, over appropriation, loss of long-term productivity, increases in the costs of water and water rights, loss of habitat, and decreases in tax revenues to the County.

Table 7 summarizes total water use in the region of influence and the predicted water use in the year 2050. According to the records of the Nevada Division of Water Resources, the combined pumping for agriculture, mining, and quasi-municipal purposes in Oasis Valley, Amargosa Desert, and Pahrump Valley now exceeds 40,000 acre-feet per year. With federal water uses added along with minor private uses in Indian Springs Valley, the total water use at present is approximately 59,000 acre-feet per year. Projections made by Nye County indicate that this demand in Oasis Valley, Amargosa Desert, and Pahrump Valley will grow to more than 100,000 acre-feet per year by the year 2050. Taking federal water use into account and the expected developments in Clark County, the projected total demand for water in the year 2050 is projected to be on the order of 141,000-acre feet. To accommodate this projected demand, it is considered very likely that every favorable location for obtaining potable groundwater in southern Nye County will be developed by the mid 21st century.

Scenario 2. Baseline Plus Yucca Mountain

The adverse impacts of the land withdrawal for the Yucca Mountain site will be additive to: 1) the radiological burden already imposed on Nye County from underground nuclear weapons testing, its related tests and experiments, and radioactive waste disposal; 2) the federal land withdrawals associated with the Nevada Test Site, the Nellis Air Force Range, and National Park lands; 3) the impacts that have resulted from federal policies aimed at preserving the environmentally sensitive areas at Devils Hole, Ash Meadows, and Death Valley National Park; and 4) the water resource use and management practices occurring on both public and private lands in Nye County

Any contaminant releases from a repository at Yucca Mountain will be additive to the contamination that already exists. The results of preliminary modeling efforts conducted by the Department of Energy indicate that a plume of contaminated groundwater may form under, and down gradient of, Yucca Mountain after closure. The leakage of radioactive contamination, as predicted by these models, indicates that further losses of water resources may occur. The predicted area of contamination from Yucca Mountain overlaps contaminant pathways and predicted contaminant plumes leading from underground nuclear weapons testing areas on the Nevada Test Site. The impacts of contaminant releases from Yucca Mountain will be additive to those from the underground nuclear weapons testing areas and to those from other contaminant sources including waste disposal facilities. Because the amount of existing contamination on the Nevada Test Site is unknown, it is difficult to determine the cumulative losses of natural resources that will occur as a result of the co-mingling of contaminant plumes from different sources. However, it is possible to determine the significance of the potential for such losses by evaluating the total contamination and contaminant sources in terms of their radioactivity.

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Table 4. Cumulative Impacts From Mission Related Activities - Scenario 1 - Baseline Cumulative Impacts				
Agency or Sector	**Actions**	**Direct Impacts**	**Indirect Impacts**	**Significance**
Department of Energy	Nevada Test Site Operations Past Actions Implement Resource Management Plan	Contamination of subsurface; Physical damage to aquifers; Water level perturbations; Increased recharge down chimneys.	Contamination of recharge; Removal of contaminated areas from future water development;	Significant resource injuries and constraints on water development
U.S. Air Force	Nellis Air Force Range Operations Past Actions	Surficial contamination; Water level perturbations.	Increased water demand in employment centers;	Not significant
Bureau of Land Management	Past Actions Implement Resource Management Plan	Reduced water availability; Increased over appropriation of Amargosa Valley; Restricted area for development; Increased water demand.	Increased water costs; Decreased tax revenues; Decreased long-term productivity of private lands; Decreased tax base growth; Increased overdraft of Pahrump Valley.	Significant increased demand for water and overdraft in Pahrump and over appropriation in Amargosa Valley.
National Park Service	Past Actions Implement General Management Plan	Reduced water availability; Increased over appropriation of Amargosa Valley; Restricted area for development; Increased appropriation time; Increased appropriation cost; Increased water demand.	Increased water costs; Decreased tax revenues; Decreased long-term productivity of private lands; Decreased tax base growth; Increased overdraft of Pahrump Valley.	Significant losses of long-term productivity of private lands, increases in costs of obtaining water rights, and decrease in tax revenues to County.
U.S. Fish & Wildlife Service	Past Actions	Reduced water availability; Increased over appropriation of Amargosa Valley; Decreased long-term productivity.	Increased water costs; Decreased tax revenues.	Significant losses of long-term productivity and tax revenues to County.
Non-federal Sector	Past Actions RFFAs Scenario 1	Overdraft of Pahrump Valley; Over appropriation of Amargosa Valley; Water levels declines; Increased appropriation time; Increased appropriation cost; Groundwater contamination.	Increased water costs; Loss of habitat and species; Increased pumping lifts; Decline of spring discharges; Potential subsidence; Increased water speculation.	Significant overdraft and loss of habitat and species in Pahrump Valley. Significant potential for over appropriation of flow system.

Table 5. Cumulative Impacts From Land Withdrawals and Designations - Scenario 1 - Baseline Cumulative Impacts				
Agency	**Withdrawal or Designation**	**Direct Impacts**	**Indirect Impacts**	**Significance**
Department of Energy	Nevada Test Site Land Withdrawal (864,000 acres ±)	Restricted area for development.	Reduced water availability; Increased water costs.	Significant reduction in water availability
U.S. Air Force	Nellis Air Force Range Withdrawal (1,290,000 acres ±)	Restricted area for development.	Reduced water availability; Increased water costs.	Significant reduction in water availability
Bureau of Land Management	46,444 acres designated for disposal 45,963 acres designated as Areas of Critical Environmental Concern	Reduced water availability; Increased over appropriation of Amargosa and Pahrump Valleys; Restricted areas for development; Increased water demand.	Increased water costs; Decreased tax revenues; Decreased long-term productivity of private lands; Decreased tax base growth;	Significant increased demand for water and overdraft in Pahrump and increased demand in Amargosa Valley.
National Park Service	Death Valley National Park Land Withdrawals (106,961 acres)	Reduced water availability; Increased over appropriation of Amargosa Valley; Restricted area for development; Increased water demand.	Increased water costs; Decreased tax revenues; Decreased long-term productivity of private lands; Decreased tax base growth.	Significant losses of long-term productivity of private lands, and decreased tax revenues to County.
U.S. Fish & Wildlife Service	Ash Meadows National Wildlife Refuge (12,000+ acres in region of influence only; does not include Railroad Valley Wildlife Management Area or co-use of Nellis Air Force Range lands)	Reduced water availability; Increased over appropriation of Amargosa Valley; Decreased long-term productivity.	Increased water costs; Decreased tax revenues.	Significant losses of long-term productivity and tax revenues to County.
U.S. Department of Agriculture	Lands designated as National Forests (<1,000 acres in region of influence) (1,942,983 acres in all of Nye County)	None identified	None identified	Not significant
Total	Withdrawal of 2,261,000 acres ±; Designation of 59,000 acres ± for conservation, wildlife, or preservation; Designation of 46,444 acres for disposal.	Reduced water availability; Increased over appropriation of Amargosa and Pahrump Valleys; Restricted areas for development; Increased water demand.	Reduced water availability; Increased water costs; Decreased long-term productivity of private lands; Decreased tax revenues.	Significant reduction in water availability, increased demand for water and overdraft in Pahrump and increased demand in Amargosa Valley, losses of long-term productivity of private lands, and decreased tax revenues

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Table 6. Cumulative Impacts From Groundwater Withdrawals - Scenario 1 - Baseline Cumulative Impacts				
Agency or Sector	**Water Right Appropriations**	**Claimed Reserved Rights**	**Estimated Peak Water Use and Year**	**Significance**
Department of Energy	353 acre feet	4,175 (interim claim per Draft Resource Management Plan)	4,175 (sum of 6 basins, peak years vary)	Claimed right exceeds perennial yield of Yucca Flat
U.S. Air Force	1,669.44 acre feet	None	159.51 acre feet	Not significant
Bureau of Land Management	Unknown	None	small	Not significant
National Park Service	none in Nye County	Claims unquantified federal reserved rights for all unappropriated water from any source on federal wilderness and/or park areas	Unknown, 2,470 acre feet average with 588 acre feet of federal use and 1,882 acre feet by non-federal users within Death Valley National Park	Unquantified claim for reserved rights may be significant; water use in National Park is not significant.
U.S. Fish & Wildlife Service	12,576 acre feet	None	24,000 (each year through evapotranspiration)	Significant water rights (more than 50% of perennial yield).
Total federal	> 15,000 acre feet	Unknown, at least 4,175 acre feet in Nye County.	> 30,804 acre feet	Significant water use and reduced water availability for other uses.
Total non-federal	Approximately 96,000 acre feet (does not include domestic wells)	None	Approximately 45,000 acre feet	Significant overdraft of Pahrump Valley
Total Cumulative	> 111,000	Unknown, > 4,175 acre feet	Approximately 76,000 acre feet	Significant overdraft of Pahrump Valley

Table 7. Estimated 1997 Use and Projected 2050 Water Demand in of the Region of Influence.			
Basin and Basin Number	**Estimated Water Use and Year**	**Estimated Use - 2050**	**Significance**
Lida Valley (144)	unknown	no projections	No significance
Stonewall Flat (145)	none reported	no projections	No significance
Sarcobatus Flat (146)	25 acre feet (1997)	no projections	No significance
Gold Flat (147)	40 acre feet (1988)	25 acre feet	No significance
Cactus Flat (148) Stone Cabin (149)	107 acre feet (1997)	107 acre feet	No significance
Groom Lake Valley (158a)	no data	no projections	No significance
Papoose Lake Valley (158b)	no data	no projections	No significance
Yucca Flat (159)	194 acre feet (1996)	no projections	No significance
Frenchman Flat (160)	273 acre feet (1996)	no projections	No significance
Indian Springs Valley (161)	660 acre feet (1992)	725 acre feet	Exceeds perennial yield in 1992 and 2050
Pahrump Valley (162)	28,819 acre feet (1997)	84,000 acre feet	Exceeds perennial yield by >50% in 1992 and by > 440% in 2050
Three Lakes Valley South (211) Three Lakes Valley North (168)	350 acre feet (1992)	9,000 acre feet	Equals perennial yield by 2050
Mercury Valley (225)	339 acre feet (1993)	no projections	No significance
Rock Valley (226)	None	8,000 acre feet	Equals perennial yield by 2050
Jackass Flats (227a)	217 acre feet (1996)	4,000 acre feet	Equals perennial yield by 2050
Buckboard Mesa (227b)	248 acre feet (1996)	3,600 acre feet	Equals perennial yield by 2050
Oasis Valley (228)	718 acre feet (1996)	2,000 acre feet	Equals perennial yield by 2050
Crater Flat (229)	1,245 acre feet (1996)	900 acre feet	Exceeds perennial yield by 38% in 1992 but likely to decrease to perennial yield by 2050 with mine shut downs
Amargosa Desert (230)	26,478 acre feet (includes Fish & Wildlife appropriations)	29,000	Combined pumpage and evapotranspiration exceeds perennial yield by 58%.
TOTAL	59,000 ± acre feet	141,000 ± acre feet	Resources over developed by 2050.

The cumulative activity of existing and future radioactive wastes and contamination within the region of influence is summarized in Table 8 and portrayed graphically in Figure 1. As shown, the baseline activity that is already present in Nye County is on the order of 310 million curies. The disposal of wastes at Yucca Mountain would increase this activity by a considerable factor. Because of the decay rates of the specific radionuclides and their daughter isotopes and the uncertainty regarding when wastes would actually be entombed in the repository, it is not possible to accurately define the total radiological burden at this time. However, given that the wastes in their current form have a total activity on the order of 14 billion curies, the wastes proposed for disposal will significantly increase Nye County's radiological burden.

Only a portion of the Yucca Mountain land withdrawal will be additive to the other federal land withdrawals associated with the Nevada Test Site, Nellis Air Force Range, and National Park lands. About one-half of the land to be withdrawn for Yucca Mountain is already withdrawn for portions of the Nevada Test Site and Nellis Air Force Range. Of the total withdrawal of 4,244.50 acres, approximately 2,000 acre will be additive. This additive portion includes prime water well locations in Crater Flat. The cumulative impact of the Yucca Mountain land withdrawal will further reduce the areas in which water resources can be developed to meet the long-term water shortfalls projected for southern Nye County. The cumulative loss of the majority of the Jackass Flats hydrographic basin and the most productive portions of the Crater Flat basin represent significant constraints on the development of the County's water supplies.

The construction and operation of a repository at Yucca Mountain will result in impacts that are additive to those that have resulted from federal policies aimed at preserving the environmentally sensitive areas at Devils Hole, Ash Meadows, and Death Valley National Park. The community of Amargosa Valley is situated *between* the DOE-managed lands and those managed by the U.S. Fish and Wildlife Service and the National Park Service. In short, the federal government has adopted a policy of permissible pollution on the DOE lands up-gradient of Amargosa Valley and absolute preservation of federal the lands down gradient of the community. The best areas for water development up-gradient from the Nevada Test Site are on the Nellis Range and thus are not available for development. Nye County is caught in the middle of these conflicting policies. The County is faced with the formidable challenge of providing potable water supplies and water for agriculture and mining without inducing the flow of contamination off of DOE lands while maintaining in perpetuity the wildlife, habitat, and cultural values associated with the Department of Interior lands. The cumulative impact of these policies is significant. It is considered very likely that Nye County may ultimately have to implement very costly water importation projects to provide its citizens with a safe supply of drinking water without adversely impacting areas designated for conservation or preservation.

Finally, the impacts of Yucca Mountain will be additive to the water resource use and management practices on both public and private lands in Nye County. Although the overall water use by Yucca Mountain is expected to be small (about 350 acre-feet per year), this demand will be additive to those of the federal government. The demand for water to support federal policies regarding federally owned or managed lands must be met from the shared water resources that are available. As a consequence, <u>any</u> water that is committed to a federal action is not available for private uses in Nye County. Thus, although the water demand of each individual federal action is not large, the demand for water to support all federal actions is large and the cumulative effect of the federal demand for water is significant.

<u>Scenario 3. Baseline Plus Yucca Mountain Plus Large-Scale Water Development</u>

Scenario 3 includes the impacts of Scenario 2 with the additive impacts of large-scale groundwater withdrawals as part of remediation of the contamination at the Nevada Test Site and interbasin water transfers to metropolitan Las Vegas. Although not being actively considered at this time, it may become

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Figure 1 Types and Depth Horizons of Radioactivity on the NTS and Yucca Mountain. Modified from US Department of Energy DOE\EIS 0243, August 1996, Environmental Impact Statement for the Nevada Test Site and Off Site Locations in the State of Nevada, Volume 1, page 4-7.

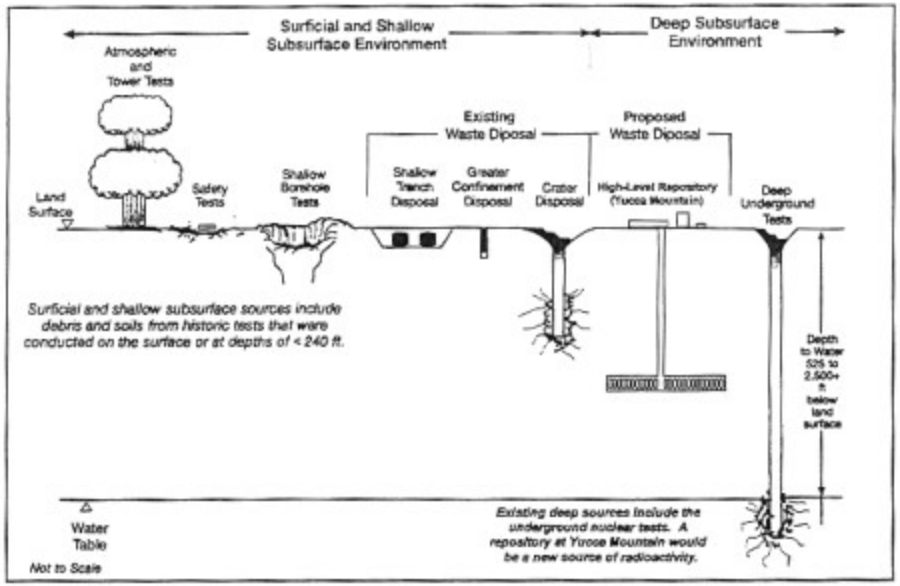

Table 8 Summary of Radioactivity in Southern Nye County, Nevada. Modified from US Department of Energy EIS for the NTS and Offsite Locations in the State of Nevada, Volume I, p. 4-6.

SOURCE OF RADIOACTIVITY	MAJOR KNOWN ISOTOPES OR WASTES	APPROXIMATE REMAINING ACTIVITY (curies)
Above Ground Tests	Americium, Cesium, Cobalt, Plutonium, Europium, Strontium	20
Safety Tests	Americium, Cesium, Cobalt, Plutonium, Strontium	35
Nuclear Rocket Tests	Cesium, Strontium	1
Shallow Borehole Tests	Americium, Cesium, Cobalt, Europium Plutonium, Strontium	2,000 at land surface unknown at depth
Shallow Land Disposal	Dry Packaged Low-Level & Mixed Wastes	500,000[a]
Crater Disposal	Bulk Contaminated Soils & Equipment	1250[a]
Greater Confinement Disposal	Tritium, Americium	9.3 million[a]
U.S. Ecology Beatty LLW Facility	Cobalt, Cesium, Iron, Tritium	710,000[b]
Deep Underground Tests	Tritium; Fission & Activation Products	Greater than 300 million
High-Level Waste Repository	Cesium, Plutonium, Strontium, Americium	Greater than 14 billion[c]

[a] Inventory at time of disposal (not corrected for decay). All other values are corrected for decay to January 1996.
[b] Total curies as of Dec. 31, 1992 per James L. Grant & Associates, Inc. December 21, 1993
[c] Summed from Sinnnock et al. (1987)

necessary to implement active groundwater controls to remediate the spread of contamination at the underground nuclear weapons testing areas on the Nevada Test Site. Examples of active controls include pump and treat systems (where contaminated water is pumped to the surface and evaporated or treated) and the creation of groundwater barriers such as hydraulic divides. Such controls, if implemented, will have two significant additive impacts: 1) the water withdrawals used to control contamination will increase the demand on the resources and further limit the water available for other purposes; and 2) groundwater flow paths and travel times may be significantly altered in the region as a whole.

Future water development in the region for non-federal purposes may also alter groundwater flow paths and travel times and could induce the flow of contaminated groundwater toward municipal well fields. As previously discussed, the Las Vegas Valley Water District has filed applications to withdraw as much water as can be permitted from basins located hydraulically up gradient of Nye County. In 1995, the U.S. Geological Survey published the results of numerical simulations of the proposed water withdrawals from rural areas in Clark, Lincoln, Nye, and White Pine counties. Although the modeling approach used is open to question, the results suggest that these water withdrawals, should they go forward, can potentially alter the groundwater flow paths dramatically in the vicinity of Yucca Mountain. (See Schaefer and Harrill, 1995, US Geological Survey Water Resources Investigation 95-4173, pp. 26-27.) Even if the Southern Nevada Water Authority does not go forward with its proposed regional water withdrawals, it is likely that the remaining water resources of the region be developed within the next 50 years. Further, it is considered very likely that all of the remaining water in the region down gradient of Yucca Mountain will also be developed within the next 50 years.

Given the state-of-the-art of numerical modeling, it is not possible at this time to state what the cumulative impact of large-scale groundwater development for water supply and remediation would be. In other areas where such development has occurred (such as Pahrump Valley and Las Vegas Valley) large-scale water withdrawals have resulted in significant impacts including the lowering of water levels, the loss of springs and their associated habitat and wildlife values, subsidence, and potential water quality degradation. The development of the remaining water resources in southern Nye County will have to be carefully planned to avoid exacerbating the spread of contamination from the Nevada Test Site and the additive contamination that could result from a release from a repository. It may prove necessary to import water to the region because of the cumulative limitations imposed by the operation of a repository at Yucca Mountain and policies and management practices aimed at the protection of sensitive species and wildlife habitat.

Finally, given that the results of the performance assessment for a repository at Yucca Mountain indicate that a plume of radioactive contamination may spread down gradient from the site, it is possible that active groundwater controls may have to be implemented to remediate the pollutant plume. If active groundwater controls are employed, the impacts would be as discussed for remediation on the Nevada Test Site. These impacts would be additive to the other impacts under Scenario 3.

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